ANIMAL SCIENCE

5008

CIP Code: 02.0201

This course is a year long program that provides students with an overview of the field of animal science. Students participate in a large variety of activities and laboratory work including real and simulated animal science experiences and projects. All areas that the students study can be applied to both large and small animals. Topics to be addressed include: anatomy and physiology, genetics, reproduction; nutrition, aquaculture, careers in animal science, common diseases and parasites, social and political issues related to the industry, and management practices for the care and maintenance of animals.

- Suggested Grade Levels: 10-12
- Recommended Prerequisite: Fundamentals of Agricultural Science and Business or by permission of the teacher
- A two credit/two semester course. This course can be offered for a second full year at an advanced level and may also be offered in a two or three hour block with a maximum of six credit hours.
- This course may fulfill up to two credits of the minimum science requirement for graduation.
- Animal Science may be offered as a small animal/large animal course and/or include an advanced, local content specific application such as aquaculture.
- A Core 40 directed elective as part of a technical career area.
- This course qualifies as an Academic Honors Diploma elective.
- Competencies and learning activities defined.
- This course is included as a component of the Agriculture and Natural Resources career cluster and may also be included as a component of the Engineering. Science. and Technologies, and Health Services career clusters.

Animal Science

A-1. Students shall examine the circulatory and respiratory systems of animals.

1. Discuss the pathway of blood through the heart and circulatory system.
2. Describe and compare the functions of veins, arteries, and capillaries.
3. Explain how the circulatory system affects body temperature in warm-blooded animals.
4. Describe the primary and secondary functions of the respiratory system.
5. Discuss the roles of the nose and diaphram in respiration. Address differences in the breathing mechanisms in common farm and companion animals.

A-2. Students shall explore the animal endocrine and nervous systems.

1. Explain the role of the endocrine system and discuss the unique feature of the glands.
2. Explain the "fight or flight" phenomenon.
3. Discuss how the endocrine and nervous systems interact.
4. Describe the functions of the peripheral nervous system in both domestic animals and humans.
5. Discuss what modifications can be made to epithelial tissues.
6. Describe the principal outer coverings of animals and the functions of these coverings.

A-3. Students shall examine the muscular and skeletal systems of animals.

1. Describe the three forms of muscles and their functions for six different species.
2. Discuss the production and dissipation of energy in the contraction of a muscle.
3. Explain the function of bones and how bone is reabsorbed in the body.

A-4. Students shall investigate the digestive and excretory systems.

1. Distinguish between the monogastric and ruminant digestive systems and give examples of each.
2. Describe how the mouth assists in the digestive process.
3. Discuss how the monogastric digestive system differs from an avian digestive system.
4. Explain how the shape of the kidneys differs from species to species and conjecture about the reason for this difference.

B-1. Students shall explore the process of sexual reproduction.

1. Discuss how gender is determined in the process of reproduction for agicultural livestock.
2. Examine mitosis and meiosis and relate appropriate aspects of each process to the male and female gametes of domestic animals.
3. Discuss puberty and its relation to the sexual maturation and breeding of livestock.
4. Explain the preparation required for the breeding of a female animal and relate to the idea of "grading up".
5. Explain estrous as it relates to the mating of animals.
6. Discuss parturition and how to detect when it is about to occur.
7. Examine the different systems of mating and suggest the optimum method for the common domestic animals.

B-2. Students shall investigate the role of the male in reproduction.

1. Describe the various organs and functions of the male animal reproductive system and relate to the human anatomy.
2. Discuss the similarities and differences between the male reproductive systems of species of agricultural livestock. Develop a possible rationale for the differences.
3. Describe the functions of the male hormones and identify characteristics of too much and too little male hormone in the body.

B-3. Students shall examine the role of the female in reproduction.

1. Describe the various organs and functions of the female animal reproductive system and relate to the human anatomy.
2. Discuss the similarities and differences between the female reproductive systems of species of agricultural livestock. Develop a possible rationale for the differences.
3. Describe the functions of the female hormones in the estrous cycle and compare this process to that of human females.

B-4. Students shall examine the processes of artificial insemination and embryo transfer and their practical and social implications.

1. Describe the equipment and procedures involved in the artificial insemination of cattle and hogs. Examine the advantages and disadvantages of artificial insemination in livestock.
2. Discuss motility in sperm and the factors affecting it and other aspects of sperm production.

3. Describe the process of embryo transfer and the advantages and disadvantages of its use.

4. Address the social implications and concerns involved in reproductive and genetic manipulation in animals.
5. Discuss similarities in advances in animal reproduction and human infertility treatments.

C. Students shall examine the genetics of animal breeding.

1. Differentiate between genotype and phenotype. Address the appearance and the genetics of the animal.
2. Explain the law of segregation and the law of independent assortment. Cite examples of each and relate to Gregor Mendel's original experiments.
3. Describe the function of chromosomes and genes in the context of RNA and DNA information.
4. Address the factors involved in dominant and recessive characteristics of canine genotype. Describe how these are important in the breeding of pedigreed dogs.
5. Describe the process of complete and incomplete dominance. Identify physical characteristics of example animals in each category.
6. Explain how an animal's sex is genetically predetermined. Compare poultry with other domestics animals and humans.
7. Describe and calculate heritability estimates for economically important traits in agricultural livestock.
8. Discuss sex linked characteristics in both animals and humans. Cite examples in animals and humans and relate to decisions about reproduction in general.
9. Explain genetic cross-over and mutation. Address the possible physical outcomes for the progeny.
10. Describe inbreeding and its positive and negative effects. Discuss its use in changing the size and facial characteristics of dogs such as the bulldog.
11. Describe expected progeny differences and how they relate to the genetic make-up of an individual. Devise and perform an experiment to test the conjecture.

D. Students shall analyze the diseases and parasites that affect animals.

1. Differentiate among viral, bacterial, fungal, and protozoa diseases and cite specific examples of each.
2. Describe diseases common to the various species of livestock and their mode of infection, symptoms, and effects on the animal.
3. Cite several diseases for swine, sheep, and cattle and apply the principles of proper animal management to the prevention and control of these diseases.
4. Describe host and life cycle as it relates to parasites. Discuss appropriate treatments based upon the parasitic life cycle.
5. Compare the methods of administering medication and vaccines to animals. Discuss the preferred method for several specific treatments.

6. Describe the symptoms of and effects of internal parasites on their various hosts. Cite management practices that will avoid problems.
7. Discuss the problems involved in the treatment of diseases and parasites. Address issues related to cost, profitability, animal rights and the role of vetenarians in farm animal health.

E. Students shall explore proper animal nutrition.

1. Relate the classification of nutrients of livestock feeds to the process of synthesizing of nutrients by animals. Cite examples from specific feed labels.
2. Explain the purpose and function of minerals and water in the body.
3. Discuss feeds based upon vitamins, their functions, fiber content and total digestible nutrients. Include examples of good and inappropriate animal feeds.
4. Classify concentrates on the basis of composition and feeding value and generate an evaluation system for commercially produced animal feeds.
5. Discuss the processing of by-products used in feed and relate to sources of plant proteins and animal proteins available in livestock feeds.
6. Distinguish among the various classes of feed additives and production stimulants used for the various species. Address concerns of environmentalists about the effects of these chemicals on consumers.
7. Explain the process of digestion in ruminant, monogastric, and avian species. Relate the differences to appropriate feeding regimens.
8. Discuss the nutritional requirements for several classes and species of livestock, select appropriate feed for various ages, and compute balanced rations for five different domestic animals based on the Pearson Square Method.

F. Students shall explore careers in the animal industry.

1. Evaluate the types of careers related to the animal industry based upon educational requirements, employment opportunities, working conditions, type of pay, and advancement opportunities. Generate criteria for determining the relative strengths of each occupation in the current economy.
2. Discuss how jobs related to the animal industry have changed over the past one hundred years. Address how scientific advancements have impacted the agricultural job market.
3. Predict a scenario for animal industry jobs of the future. Discuss how worldwide population growth will influence plant versus animal food production.

G. Students shall analyze social and political issues in the animal industry.

1. Examine animal rights issues and choose three on which to make a stand. Identify and support a position both in writing and verbally.
2. Discuss modern production practices that relate to animal rights issues from the perspective of both producers and animal rights groups.

3. Formulate a position related to the debate between vegetarians and livestock producers about the best use of land and grains.
4. Discuss the economic ramifications for both the consumer and producer of altering production practices related to livestock animals.

H. Students shall examine management practices in the care and maintenance of animals.

1. Discuss the appropriate land, housing, pens, fencing, and watering facilities needed for the proper care of a given livestock species.
2. Discuss the procedures necessary for the technical maintenance of livestock and pets, such as yearly vaccinations, castration, and dehorning. Respond to those concerned with the so-called mutilation of the animal with a cogent argument.
3. Relate the requirements for "good conformation" in farm livestock with the specific purpose for which the animal is being raised.
4. Discuss the USDA standards by which meat is graded and inspected for all species. Devise a set of recommendations for how these standards could be improved.
5. Examine the recommended procedures for proper animal sanitation. Address the difficulties that need to be overcome and cite specific examples of good practice.
6. Given a specific number of hogs, plan and construct a model of appropriate livestock facilities for handling the hogs if there is high capital available.

I. Students shall examine aquaculture and other new technological animal production systems.

1. Describe the history of aquaculture and relate it to the impact of aquaculture on the economy of the United States and foreign markets.
2. Explain the appropriate environment that fish require and the chemicals and fertilizers used in fish production. Address the effect chemicals have on the quality of meat produced.
3. Discuss the different types of fish reproduction, egg collections, and fertilization. Relate the characteristics of fish reproduction to those of warm-blooded domestic animals.
4. Describe the most popular species of fish breeds and identify the diseases and most prescribed treatments. Address recent news reports of the lack of freshness of fish for the consumer.
5. Examine career options in aquaculture and identify the requirements for entry-level positions and career advancement.
6. Discuss why the National Aquaculture Act was passed and explain how it has impacted the industry.
7. Predict other species in which technological advances might allow concentrated production of animals for human consumption. Justify your reasoning and indicate possible problems with environmental or conservation groups.